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CONTENTS

THE PERFORMANCE OF NEURAL MACHINE TRANSLATION
IN THE INDONESIAN TRANSLATION OF
THREE FUNDAMENTAL CATHOLIC PRAYERS

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Abstract

Literary translation is one of the greatest obstacles to neural machine translation development (NMT). NMT precision is susceptible to common issues in literary texts, such as lexical ambiguity, complex syntax, and structural grammatical constructions. This study investigates the literary translation of three Catholic prayers: "The Sign of the Cross," "The Lord's Prayer," and "Hail Mary." These objects have been selected for their distinctive linguistic characteristics, such as archaic vocabulary, uncommon structures, and unique line breaks. The purpose of this study is to evaluate the NMT's ability to overcome obstacles in literary translation based on the number of errors produced, a discussion of the errors, and the relative difficulty of their correction, as stated by Hutchins and Somers. On the basis of Koponen's theory emphasizing semantic accuracy, the errors produced by MTs are divided into two main categories: individual concept errors and relation between concepts errors. Subcategories are subsequently created from the two categories. The quantitative data indicates that the most common individual concept error is mistranslation, while the most common relation between concepts error is misunderstanding. The primary objective of this study is to evaluate the performance of NMT in translating the three Catholic fundamental prayers. The library and survey methods are used for this research. In library method, researchers compare multiple theories and related studies. In the meantime, for the survey, the researchers distribute questionnaires to respondents to assess the accuracy and readability of the NMT's translation.

Keywords: *Catholic prayers, Koponen error category, neural machine translation*

INTRODUCTION

Since approximately the second century, translation work, whether oral or written, has been a vital activity. With the advancement of technology, humans with their intelligence have created machines to facilitate an instantaneous transfer between languages, as well as to facilitate the exchange of information and the dissemination of knowledge, which was once a difficult process. Since its development in 1949, machine translation (MT) has been in high demand. Nonetheless, despite undergoing extensive and ongoing quality improvement, MT has not yet reached the point of complete dependability.

The quality of a translation, whether human or machine-made, has been a long-discussed topic with no universal metric. Depending on the circumstances surrounding the practise, there are various factors to prioritise, such as precision, naturalness, fluency, function, etc. In the case of machine translation, which is frequently used to obtain quick information about a text, "semantic accuracy should likely take precedence over fluency" (Koponen, 2010:2).

Depending on the type of text, achieving semantic accuracy presents varying degrees of difficulty. In the case of automatic translation, conversing texts that are to be translated literally, such as legal, academic, or business text, are systematically simpler than those that are to be translated artistically. The accuracy of machine translation is susceptible to problems commonly found in literary texts, such as lexical ambiguity, syntax complexity, structural grammatical constructions, unfamiliar words, and literary language (Hutchins and Somers, 2003:2-3, Benjamin, 2019).

This study investigates the application of automatic literary translation to three fundamental Catholic prayers: "Sign of the Cross," "The Lord's Prayer," also known as "Our Father" (Traditional version from The Book of Common Prayer 1928 edition), and "The Hail Mary." The selection of the prayers is based on the unique style of their language, which is a mixture of modern and archaic English resulting from the numerous revisions of the prayers throughout the history of English. The texts contain archaic terms such as art (the archaic form of are), thou, thee, thy, and thine. The style of the prayers resembles that of poetry, as evidenced by lines such as "Thy will be done on earth as it is in heaven" and "Blessed art thou among women, and blessed is the fruit of thy womb, Jesus," as well as the 'poetic' word order of "Forgive us our transgressions," "Thy will be done," and "Hallowed be Thy name."

This study evaluates the performance of Google Translate's NMT when translating prayers. Google Translate uses neural machine translation, a system that employs deep learning techniques to translate entire sentences at once. Examining and measuring the readability of the NMT's translation output will be used to conduct the study.

This study aims to analyse the errors found in NMT Google Translate's translations of the religious texts Sign of the Cross, The Lord's Prayer, and Hail Mary. Koponen's classification theory for machine translation errors will be used to evaluate the translation quality of the two MTs. The second objective is to evaluate the readability of Google Translate's NMT output when translating the three Catholic prayers. As proposed by Hutchins and Somers, the outcome will demonstrate the performance of the NMT in translating religious texts based on the number of errors made and the relative difficulty of the errors.

Theoretically, the research is also expected to expand the translation technology research repertoire that translation scholars can use to test Koponen's theory's applicability to NMTs translation. Practically, the research is anticipated to benefit translation practitioners and NMT developers by revealing the performance of NMT in translating literary texts, in this case Catholic prayers.

Koponen's Error Classification in Machine Translation

Koponen (2010) proposes her theory of machine translation error classification and the idea of evaluating the quality of MT products using error analysis, similar to what Hutchins and Somers state about the method of error analysis in machine translation. Koponen's theory could also be a solution to the subjectivity problem identified by Hutchins and Somers, namely the need for a classification of errors based on linguistics phenomenon types. According to Koponen, the purpose of her research is to create an error classification that emphasises semantic accuracy. Error is the "semantic component not shared by source text (ST) and target text (TT)" (2010:3), and semantic component is "individual concepts and the semantic relations between two concepts (head and dependent)" (p.3). She adds that concepts are represented by content words, which can be units larger than single words, such as compound nouns, names, and idioms, whereas relations are expressed by function words, such as inflection and word order (p.3).

Koponen divides the errors into two major categories: 1) Errors resulting from mismatches between source concepts and target concepts, and 2) Errors resulting from mismatches in the relations between concepts. When comparing concepts, acceptable lexical choices were those that conveyed the correct meaning, regardless of whether they were the most frequent or idiomatic option. In comparing relations, a relation was only considered present in the target sentence if it could be parsed without difficulty (p. 3-4).

There are six subcategories of mismatches between the source and target concept: omitted, added, untranslated, mistranslated, substituted, and explicitated concepts. Their definitions are provided by Koponen and illustrated by Tirtayasa and Setiajid's study (2020) as follows: omitted, added, untranslated, mistranslated, substituted, and explicitated concepts.

Table 1. Koponen's classification of individual concept error

Concept Error	Description by Koponen (2010:4)	Example by Koponen
Omitted Concept	ST concept that is not conveyed by the TT.	ST: The locale **places** them at one of the most important... TT: Locale person has one of the most important... (p.4)
Added Concept	TT concept that is not present in the ST.	ST: The locale places them at one of the most important... TT: Locale **person** has one of the most important... (p.4)
Untranslated Concept	SL words that appear in TT.	ST: The locale places them at one of the most important... TT: **Locale** person has one of the most important... (p.4)
Mistranslated Concept	A TT concept has the wrong meaning for the context.	ST: ..one of the most enduring mysteries in all of human **evolution**. TT: ..one enduring secrets on all humane **development**'s. (p.4)
Substituted Concept	TT concept is not a direct lexical equivalent for ST concept but can be considered a valid replacement for the context.	ST: click TT: select (in Finnish) (p.4) the verb 'click' is often replaced with a more generic concept 'select'. According to the strict classification, this would count as two errors (omission of 'click' and addition of 'select'). However, 'select' is often used in this type of texts and contexts, and it is a valid substitution rather than an error.
Explicitated Concept	TT concept explicitly states information left implicit in ST without adding information.	ST: program TT: Norton AntiVirus (p.4)

METHODOLOGY

The data in this study are objective, i.e., they are taken from the source text (ST) and the target text (TT); consequently, the data are collected directly from the translation products of the two MTs in translating "Sign of Cross," "The Lord's Prayers," and "Hail Mary" rather than from previous studies. This research uses both qualitative and quantitative data to assess quality. Qualitative data are utilised in the description and elaboration of errors, including their potential causes, as well as in the discussion of relative difficulty correction. In order to count the number of errors made by MTs in their translation products, quantitative data is utilised.

This study uses library research to collect definitions, theories, related studies, and arguments or statements in support of the thesis. According to George (2008), the library research method entails "identifying and locating sources that provide factual information or personal/expert opinion on the research question" (p.6). This is a qualitative study, which means the discussion "focuses on answering "how" and "why" questions in an effort to comprehend a phenomenon or context" (Cleland, 2017). The data analysis consists of an explanation of the errors by identifying the type of error and the possible source of the error, along with a discussion of the relative difficulty of correcting the errors. Utilizing a quantitative method, the number of errors made by MTs in their translation products is counted in order to determine their performances. According to George, quantitative method "describes any method in which the phenomenon under investigation is captured through measurement and expressed in numbers that can be analysed" (2008:7).

In addition, quantitative research is defined by George as "any method in which the phenomenon under study is captured through measurement and expressed in numbers that can be analysed." In this study, survey methods are used as the quantitative method. According to George, the defining characteristic of the survey method is that it "asks a group of people a question with a selection of possible answers." The data are analysed line by line (according to the Vatican's version of line breaks) to identify errors at the word, phrase, and/or sentence level. According to Koponen's classification for evaluating translation machines, the errors found will be categorised into two main categories (p.11). The comparison between the performances of the two MTs is based on the number of errors made by each MT as well as the discussion regarding the relative difficulty of correcting errors.

RESULTS AND DISCUSSION

There are a total of 26 errors in the Google Translate translations of the three Catholic Prayers. 17 of the total 26 errors fall under the category of individual concept error, while 9 errors fall under the category of relation between concept error. This subchapter's discussion and analysis is divided into two sections based on Koponen's primary classification of errors. Individual concept errors and relationship between concept errors are the two components. For each main category, subcategories of errors are used to group the discussion. Individual concept error refers to an error made by a machine translator (MT) on a single concept, which is represented by content words such as noun, verb, and adjective. Koponen explains further that "one concept" is not necessarily represented by a single word, but rather by "units larger than individual words, such as compound nouns, proper names, and idioms" (Koponen, 2010:3).
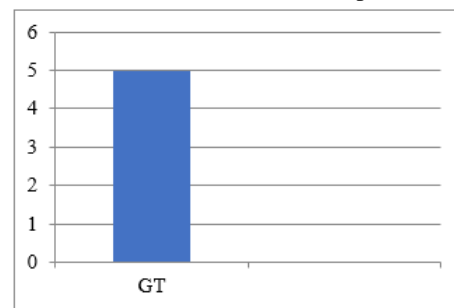
Chart 1. Individual concept errors
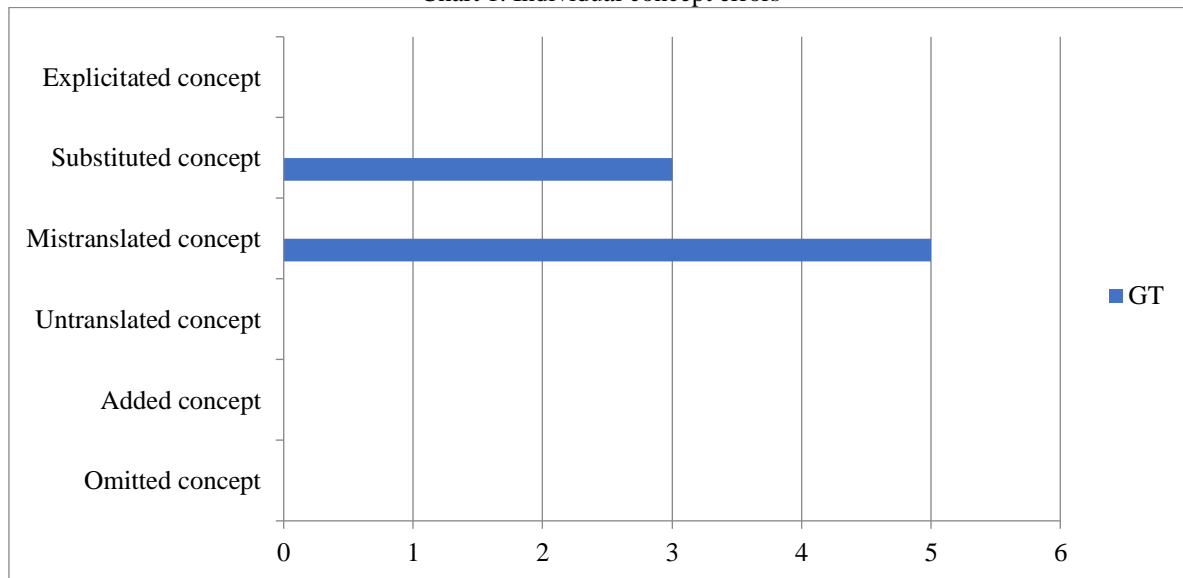
Two subcategories of individual concept error, omitted concept error and explicated concept error, are absent from MT translation products, while mistranslated concept is the most common error in this category.

The following table provides a summary of the individual concept errors uncovered by this study.

Table 2. Individual concept errors committed by GT

No. of case	No. of data	ST	No. of data	TT
Mistranslated Concept Errors				
Mistranslated Adjective				
3	21/ST/ HM/L3	**Blessed** art thou amongst women	21/TT3/ GT/ SM/L3	**Diberkatilah** engkau di antara para wanita
Mistranslated Verb				
5	12/ST/ LP/L8	as we forgive those who **trespass** against us	12/TT2/ GT/ DT/L8	saat kami memaafkan mereka yang **melanggar** kami
7	8/ST/ LP/L4	thy will **be done**	8/TT2/ GT/ DT/L4	Kehendakmu **selesai**
8	24/ST/ HM/L6	**pray** for us sinners	24/TT3/ GT/ SM/L6	**berdoa** untuk kami yang berdosa,
10	25/ST/ HM/L7	now and at the hour of **our** death	25/TT3/ GT/ SM/L7	sekarang dan pada saat kematian **kita**.
1	10/ST/ LP/L6	Give us this day our daily **bread**	10/TT2/ GT/ DT/L6	Beri kami hari ini **makanan** kami sehari-hari
2	23/ST/ HM/L5	**Holy** Mary, Mother of God	23/TT3/ GT/ SM/L5	**Santa** Maria, Bunda Allah,
4	17/ST/ LP/L13	For ever and ever	17/TT2/ GT/ DT/L13	Selama-lamanya

a. Mistranslated Concept

Mistranslated concept error, as described by Koponen, is a TT concept that has the wrong meaning for the context, which means that an error is classified as a mistranslation if a concept conveyed by the TT is not what was intended to be conveyed by that in the ST, or if the concepts in the TT are not equivalent to those in the ST (2010:4).

Chart 2. Mistranslated Concept Error

The mistranslation of a concept is the most common category of error made by GT. In total, GT committed five errors. Based on the lexical category of the mistranslated concepts, the concept translation errors are subclassified. There are 2 noun mistranslations, 2 adjective mistranslations, 4 verb mistranslations, and 3 pronoun mistranslations. There are two incorrectly translated adjectives in the translation products. Interestingly, both errors result from the same word, "blessed," but GT and BT each make an error in a different line.

Table 3 Mistranslated concept error case 3

No.	ST	No.	TT	Type of Errors	Alternative Translation
21/ ST/ HM/ L3	**Blessed** art thou amongst women	21/ TT3/ GT/ SM/ L3	**Diberkatilah** engkau di antara para wanita	Mis-translated Adjective	Terberkatilah engkau diantara wanita

In this instance, the adjective "blessed" rendered as "diberkatilah" by GT is actually understandable in Indonesian. The only issue

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is that "diberkatilah" is not present in KBBI, which indicates that it is a non-standard form of "terberkatilah," which is rendered correctly by BT in this line.

The researcher had a difficult time deciding whether or not this "error" should be counted, given that the TT sounds normal in native Indonesian. However, since the study is somewhat comparative of the performances of the two MTs, this case is counted as an error to give credit to BT for translating the word into its standard form.

The relative difficulty correction for this particular word requires only a simple correction to GT's vocabulary. Aside from that, the error is not considered fatal because it sounds natural in Indonesian and the use of non-standard form is a common error even among native speakers.

b. Mistranslated verb
There are three errors of incorrectly translated verbs by GT.

Table 4 Mistranslated concept error case 5

No.	ST	No.	TT	Type of Errors	Alternative Translation
12/ ST/ LP/ L8	as we forgive those who **trespass** against us	12/ TT2/ GT/ DT/ L8	**saat** kami memaafkan mereka yang **melanggar** kami	Mistransl ated verb	Seperti kami memaafkan mereka yang berdosa terhadap kami.

Even though "melanggar" is one of the direct equivalences of "trespass," the GT translation of "trespass" into "melanggar" does not perform the same semantic meanings between the ST and TT in this context. According to Collins Dictionary of English, the archaic English translation of the verb "trespass" is "sin or transgression," which is frequently followed by "against." In the TT, trespass is rendered in Indonesian as "melanggar," which the KBBI defines as "menyalahi; melawan (hukum), melewati; melalui (secara tidak adil); melalui (secara tidak adil); melalui (secara tidak adil); melalui (secara tidak a Therefore, the Indonesian translation of "trespass against us" as "melanggar kami" makes no sense.

Table 4 Mistranslated concept error case 7

No.	ST	No.	TT	Type of Errors	Alternative Translation
8/ST/LP/L4	thy will **be done**	8/TT2/GT/DT/L4	Kehendakmu **selesai**	Mistranslated verb	Dijadikanlah kehendakmu

In this line, the MT encounters a structure that is uncommon in contemporary English: the presence of "be" as the present subjunctive (imperative) signifying wish or hope. Collins dictionary (n.d.) describes subjunctive as "formerly used in English for improbable situations or to express a wish." According to Merriam-Webster, "the subjunctive is most noticeable with the common but grammatically complex verb be." In the present subjunctive, be does not change from be to am, are, or is depending on the subject (n.d). A sentence such as "I hope you are saved" indicates a wish. With this interpretation, the context of the line is a request for God to carry out his will; therefore, the "will" is not yet "done" but is wished to be "done" by the praying people. The literal translation of "Kehendakmu selesai" into English is "Thy will is/has ended," which changes the subjunctive mood to indicative mood and does not convey the intended meaning. Since the subjunctive form of bare "be" + v3 is rarely used in modern English, the correction may require a new syntactical alteration or addition for the MT to recognise the old subjunctive form as a not-yet-completed action (merely a wish) and translate the ST into a grammatically correct form in the TL. In the case of Bahasa Indonesia, the subjunctive mood can be translated by adding the suffix –lah, for example.

Table 5 Mistranslated concept error case 8

No.	ST	No.	TT	Type of Errors	Alternative Translation
24/ ST/ HM/ L6	**pray** for us sinners	24/ TT3/ GT/ SM/ L6	**berdoa** untuk kami yang berdosa,	Mistransl ated Verb	**berdoalah** untuk kami orang-orang berdosa

The use of bare verbs is another common subjunctive construction in English. According to Collins dictionary, present subjunctive is "exactly the same as the base form in all persons of the verb." Thus, there is no s at the end of "third person singular." This

line is part of the full sentence "Holy Mary, Mother of God, pray for us sinners." In this line, the ST conveys an imperative tone, requesting that Mother Mary pray for the sinners, as evidenced by the use of the uninflected verb "pray." If the line conveys an indicative mood with the subject "Holy Mary," "prays" or the archaic English form "prayeth" should be used.

In Bahasa Indonesia, –kan, –lah, and/or an exclamation mark at the end of the line or sentence are added to indicate an imperative line. In this context, the speaker is addressing a supreme being; therefore, the imparative sentence becomes more like a polite request, and the ideal particle to use is –lah, so "pray" should ideally be rendered as "berdoalah." The GT does not convey the imperative tone of the sentence, so in English the TT becomes "(Mary) prays for us sinners," which is not the intended meaning of the line. According to the English Grammatical rule, the GT system should have recognised that the verb indicates subjunctive mood as opposed to indicative or declarative; however, the problem may be that the GT system does not "know" how to transfer subjunctive mood from English to Indonesian; consequently, the MT simply translates the verb into the present tense in declarative form.

c. Mistranslated pronoun

According to Koponen, 'concept' could be represented by content words, while 'relationship between concepts' could be represented by function words (2010:3). Even though technically a pronoun is a function word, this error is classified as an individual concept error because the mistranslated pronoun has no effect on other concepts in the line and has no relationship with other concepts. Due to the fact that the mistranslation stands alone on the pronoun, it does not alter the semantic role or relationship between the head and dependent concepts in the TT, and thus does not qualify as a relation between concepts error.

Table 5 Mistranslated concept error case 8

No.	ST	No.	TT	Type of Errors	Alternative Translation
25/ ST/ HM/ L7	now and at the hour of **our** death	25/ TT3/ GT/ SM/ L7	sekarang dan pada saat kematian kita.	Mis translated pronoun	sekarang dan pada saat kematian kami.

The discussions for the two error cases are merged because they pertain to the same subject.

The pronoun "our" in Indonesian has two direct meanings, which are "kami" and "kita," which are used differently. "kami" is used when the person to whom the speaker is speaking is omitted, whereas "kita" is used when the person is included. GT's and BT's translations of "our" as "kita" are correct in a literal sense if the context of the text is ignored. However, since the context of the text as a prayer is that the speaker is speaking to the supreme being — in this case, God and Mother Mary — the translation is incorrect. "our" in the table above refers to those who are praying, excluding "God" and "the Father." In this context, translating "our" as "kita" indicates that the "Father" is both the "Father" of the praying people and of God. "Our" refers to those who are praying, excluding Mother Mary, so "our" should be rendered as "kami" here. To say "the hour of our death" as "saat kematian kita" would imply "the hour of Mother Mary's death" as well, which is obviously not the meaning conveyed by the ST.

Conclusion

In Google Translate's Indonesian translations of "Sign of the Cross," "The Lord's Prayer," and "Hail Mary," errors are produced in 9 of Koponen's 14 subcategories, namely added concept, untranslated concept, mistranslated concept, substituted concept, added participant, added relation, mistaken relation, substituted relation, and susbtituted relation. The most common error in the category of individual concept errors is mistranslation, while the most common error in the category of relation between concepts errors is mistaken relation.

Except for the subcategories of substituted concept and mistaken relation, GT's quantitative performance is continuously superior. A conclusive conclusion regarding which MT performs better cannot be drawn solely from quantitative data.

The MTs' quantitative performances are satisfactory. GT's superiority is supported by the qualitative findingsGT's translations contain no destructive errors.

GT's superior performance is also evidenced by their extensive vocabulary. There is no discernible pattern or tendency for certain line characteristics in which certain MTs make certain errors, but in general, GT struggles with problems commonly found in literary texts, such as lexical ambiguity, syntax complexity, structural grammatical constructions, unfamiliar words, and literary languages, whereas the two MTs are able to produce adequate translations for well-structured lines. In conclusion, for literary translation, MT is not yet reliable; human intervention is required in every respect.

This result, however, is limited to the objects of Catholic prayers with the aforementioned characteristics; for other types of literary texts, the findings can certainly vary, particularly since there is no statistically significant difference between the performance of the two MTs. Another limitation of this study is that it does not take into account diction, style, and naturalness when comparing the MT products, focusing instead on identifying errors.

Future research on related topics and objects, especially those focusing on alternative points of view, is strongly encouraged. This study can be used as a guide and a review of the quality development of machine translation technology.

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